

## **BAB VI**

### **KESIMPULAN DAN SARAN**

#### **6.1. Kesimpulan**

1. Perbedaan konsentrasi daun stevia memberikan pengaruh nyata terhadap komposisi fitokimia; kadar total fenol; total flavonoid; aktivitas antioksidan dengan metode DPPH (*2,2-diphenil-1-picrylhydrazyl*); serta kemampuan mereduksi ion besi pada minuman teh hijau.
2. Berdasarkan hasil pengujian, didapatkan perlakuan yang memiliki aktivitas antioksidan tertinggi adalah perlakuan P6 (0,37%), yaitu 1,48 gram daun stevia yang diseduh pada 400 ml air panas (90°-95°C), dengan nilai total fenol sebesar 307,1667 mg GAE/L sampel; nilai total flavonoid 33,3306 mg CE/L sampel; aktivitas antioksidan kemampuan menangkap radikal bebas DPPH sebesar 37,3362 mg GAE/L sampel; kemampuan mereduksi ion besi sebesar 504,7407 mg GAE/L sampel.
3. Berdasarkan hasil *Pearson Correlation* antara total flavonoid dengan kemampuan menangkap radikal DPPH pada minuman teh hijau daun stevia diketahui bahwa memiliki aktivitas antioksidan primer.

#### **6.2. Saran**

Perlu penelitian lebih lanjut mengenai konsentrasi daun stevia yang memiliki aktivitas antioksidan tertinggi secara *in vivo* pada minuman teh hijau.

## DAFTAR PUSTAKA

- Abou-Arab, A. Esmat., A. Azza Abou-Arab, and M.F. Abu-Salem. 2010. *Physico-chemical Assessment of Natural Sweeteners Steviosides Produced from Stevia rebaudiana bertonii M plant*. African Journal of Food Science, Vol 4: 269-281.
- Alumniits. 2009. *Teh dan Khasiatnya Bagi Kesehatan*. <http://www.alumniits.com> (13 Oktober 2015)
- Amic, D., and T. Beslo. 2003. *Structure Radical Scavenging Activity Relationship of Flavonoids*. Croatia Chemical Acta 76 (1): 55-61.
- Apak, R., K. Guclu, B. Demirata, M. Ozyurek, and B. Bektapoolu. 2007. *Comparative Evaluation of Various Total Antioxidant Capacity Assay Applied to Phenolic Compounds*. CUPRAC Assay, Molecules 12: 1496-1547.
- Chapagain, P. 2006. *Characteristic of Desert Date (balanites aegyptiaca) Saponins and Their Biological Activities*. Fakultas Teknik Universitas Ben-Gurion.
- Clarkson, P. M and H. S. Thompson. 2000. *Antioxidants: What Role Do They Play in Physical Activity and Health*. Journal Nutritional Biochemistry, 72: 637S-46S.
- Daroini, O. S. 2006. *Kajian Proses Pembuatan Teh Herbal dari Campuran Teh Hijau (Camellia sinensis), Rimpang Bangle (Zingiber cassumunar r.) dan Daun Ceremai (Phyllanthus acidus L.)*. Skripsi S-1 Institut Pertanian Bogor.
- Dehkharghanian M, Adenier H, and Vijayalakshmi M. 2010. *Analytical Methods Study of Flavonoids in Aqueous Spinach Extract Using Positive Electrospray Ionization Tandem Quadruple Mass Spectrometry*. Food Chemistry 121:863-870
- Dey, P.M. and J.B. Harborne. 1997. *Plant Biochemistry*. San Diego: Academic Press.

- EFSA. 2010. *Scientific Opinion on The Safety of Steviol Glycosides for The Proposed Uses as a Food Additives*. EFSA Journal, 2010.8, 1537.
- Fennema. 1996. *Food Chemistry 3<sup>th</sup> Edition*. New York: Marcel Dekker, Inc.
- Graham, H.N. 1984. *Tea: The Plant and Its Manufacture: Chemistry and Consumption of the Beverage*. In Liss AR. *The Methylxanthine Beverages and Foods: Chemistry, Consumption, and Health Effects*. Prog Clin Biol Rev: 29-74.
- Harborne, J.B. 1996. *Metode Fitokimia*. Padmawinata, K. dan I. Soediro, penerjemah. Bandung: Institut Teknologi Bandung.
- Hartanto, H. 2012. *Identifikasi Potensi Antioksidan Minuman Cokelat dari Kakao Lindak (Theobroma Cacao l) dengan Berbagai Cara Preparasi: Metode Radikal Bebas 1,1 Diphenyl-2-Picrylhydrazil (DPPH)*. Skripsi S-1 Universitas Katolik Widya Mandala Surabaya.
- Haryadi, A. 2012. *Teknologi Cokelat*. Yogyakarta: Universitas Gadjah Mada.
- Helmenstine, P and Anne Marie. 2011. *Theobromine Chemistry*. <http://chemistry.about.com> (14 Oktober 2015)
- Houghton, P.J. and Raman, A. 1998. *Laboratory Handbook for The Fractionation of Natural Extracts*. London: Thomson Science.
- Kahkonen, M.P., A. I. Hopia, and H. J. Vuorela. 1999. *Antioxidant Activity of Plant Extracts Containing Phenolic Compounds*. Journal of Agriculture and Food Chemistry. 47, 3954-3962.
- Karadag, A., B. Ozcelik, and S. Saner. 2009. Review of Methods to Determine Antioxidant Capacities, *Food Analytical Methods* (2):41-60.
- Khoddami, A., Meredith A. W., and Thomas H. R. 2013. *Techniques for Analysis of Plant Phenolic Compounds*. Molecules. 8: 2328-75.
- Kristanti, A. N., N. S. Aminah, M. Tanjung, dan B. Kurniadi. 2008. *Buku Ajar Fitokimia*. Surabaya: Airlangga University Press.

- Kumar, S., D. Kumar, Manjusha, K. Saroha, N. Singh, and B. Vashishta. 2008. Antioxidant and Free Radical Scavenging Potential of *Citrullus colocynthis* (L.) Schrad. Methanolic Fruit Extract. *Acta Pharmaceutica* 58:215-220.
- Kuncahyo, I. 2007. Uji Aktivitas Antioksidan Ekstrak Belimbing Wuluh (*Averrhoa bilimbi*, L.) Terhadap *1,1-diphenyl-2-Picrylhydrazyl* (DPPH). Yogyakarta : D-III Teknologi Farmasi Fakultas Teknik Universitas Setia Budi.
- Kustamiyati, B. 2006. *Prospek Teh Indonesia Sebagai Minuman Fungsional*. <http://www.lppi.go.id> (10 Oktober 2015)
- Kusumaningati, R.W. 2009. Analisa Kandungan Fenol Total Jahe (*Zingiber officinale*Roscoe) Secara *In vitro*.Skripsi S-1. Fakultas Kedokteran Universitas Indonesia. [www.lontar.ui.ac.id](http://www.lontar.ui.ac.id) (19 Oktober 2015).
- Lemus-Moncada, R., Vega-Galves, A., Zura-Bravo, L. and Ah-Hen, Kong. 2012. *Stevia rebaudiana* Bertoni, source of a high-potency natural sweetener : A comprehensive review on the biochemical, nutritional and functional aspect. *Food Chem.*, 132 : 1121 – 1132.
- Luger, P., M. Weber, N.X. Dung, P.H. Ngoc, D.T. Tuong, and D.D. Rang. 2000. The Crystal Structure of hop-17(21)-en-3 $\beta$ -yl acetate of *Pluchea pteropoda* Hemsl. from Vietnam. *Crystal Research and Technology* 35(3):355-362.
- Marliana, S. D., V. Suryanti, dan Suyono. 2005. Skrining Fitokimia dan Analisis Kromatografi Lapis Tipis Komponen Kimia Buah Labu Siam (*Sechium edule* Jacq. Swartz.) dalam Ekstrak Etanol. *Biofarmasi* 3 (1). Pp. 26-31
- Molyneux, P. 2004. The Use of Stable Free Radical *Diphenylpicrylhydrazyl* (DPPH) for Estimating Antioxidant Activity. *Journal Science Technology* 26(2):211-219.
- Muntana, N., and S. Prasong. 2010. Study on Total Phenolic Contents and Their Antioxidant Activities of Thai White, Red, and Black Rice Bran Extracts. *Pakistan Journal of Biological Sciences* (13)4:170-174.

- Nakiboglu, M. Urek, R.O. Kayali, dan H.A. Tarhan. 2007. *Antioxidant Capacities of Endemic Sideritis Sipylea And Origanum Sipyleum From Turkey*. Food Chemistry. 104: 630-635.
- Niwa, Y. 1997. *Radikal Bebas Mengundang Kematian*. Tokyo: Personal Care Co.Ltd. 30-87.
- Noor, Erliza dan Fifi Isdianti. 2013. *Ultrafiltrasi Aliran Silang Untuk Pemurnian Gula Stevia*. J. Tek. Ind. Pert. Vol. 21(2), 73-80.
- Packer, L. and E. Cadenas, editor. 2002. *Handbook of Antioxidant 2<sup>nd</sup> edition*. New York: Marcel Dekker, Inc.
- Park, Y.S., S.J. Kim, and H.I. Chang. 2008. Isolation of Anthocyanins from Black Rice (Heugjinjubyeo) and Screening of Its Antioxidant Activities. *Journal of Microbial Biotechnology* 36(1) : 55-60.
- Pokorny, J., N. Yanishlieva and M. Gordon. 2001. *Antioxidant In Food*. New York: CRC Press Boca Raton Boston.
- Rumiantin, R. 2011. *Kandungan Fenol, Komponen Fitokimia, dan Aktivitas Antioksidan Lamun Enhalus acoroides*. Skripsi. Jurusan Teknologi Hasil Perairan. IPB Bogor.
- Sarwono, J. 2006. *Metode Penelitian Kuantitatif dan Kualitatif*. Yogyakarta: Graha Ilmu.
- Sermakkani and Thangapandian. 2010. *Phytochemical Screening for Active Compounds in Pedalium murex L.* Recent Research and Science Technology Journal, 2(1): 110-114.
- Silalahi, J. 2006. Antioksidan dalam Diet dan Karsinogenesis. *Cermin Dunia Kedokteran*, 153: 39-42.
- Singh, S. and G. Rao. 2012. *Stevia: The Herbal Sugar of 21<sup>st</sup> Century*. Sugar Tech, 71: 17-24.
- Sjahid, L.R. 2008. *Isolasi dan Identifikasi Flavonoid dari Daun Dewandaru (Eugenia uniflora L.)*. Universitas Muhammadiyah Surakarta.

- Sompong, R., S. Siebenhandl-Ehn, G. Linsberger-Martin, and E. Berghofer. 2011. Physicochemical and Antioxidative Properties of Red and Black Rice Varieties from Thailand, China and Sri Lanka. *Food Chemistry* 124: 132-140.
- Sudijono, A. 2011. *Pengantar Statistik Pendidikan*. Jakarta: PT. Raja Grafindo Indonesia.
- Suhidayat, S dan J.R. Hutapea. 1991. *Inventaris Tanaman Obat Indonesia*. Balai Penerbitan dan Pengembangan Kesehatan.
- Sulistyowati, T. 2004. *Teh Sebagai Salah Satu Sumber Antioksidan*. <http://www.cerminduniakedokteran.com> (10 Oktober 2015)
- Sumpio B.E, Knox R.C, Dutch W, Blume P. 2006. *Diabetic Foot Disease*. *International Journal of Angiology* 9:1-6.
- Supangat, A. 2007. *Statistika dalam Kajian Deskriptif, Inferensi, dan Nonparametrik*. Jakarta: Kencana Prenada Media Group.
- Tananuwong, K., and W. Tewaruth. 2010. Extraction and Application of Antioxidants from Black Glutinous Rice. *Science direct* ISSN 476-481 <http://www.elsevier.com/locate/lwt>. Tiong, S.H., C.Y. Looi, H. Hazni, A. Arya, M. Paydar, W.F. Wong, S.C. Cheah, M.R. Mustafa, and K. Awang. 2013. Antidiabetic and Antioxidant Properties of Alkaloids from *Catharanthus roseus*(L.) G. Don. *Molecules* 18:9770-9784.
- Thomas, J., and M. Glade. 2010. Stevia: It,s not just about calories. *The Open Obesity Journal*, 2:101-109.
- Tiong, H.S., C.N. Rao, S.S. Sastry, K. Mallika, and K.B. Mahalakshmi. 2013. *Cooccurrence Matrix and Its Statistical Features as an Approach for Identification of Phase Transitions of Mesogens*. *International Journal of Innovative Research in Science, Engineering and Technology* 2: 4531-4538.
- Vichapong, J., M. Sookserm, V. Srijesdaruk, P. Swatsitang, and S. Srijaranai. 2010. High Performance Liquid Chromatographic Analysis of Phenolic Compounds and Their Antioxidant Activities in Rice Varieties. *Journal of Food Science and Technology* 43:1325-1330.

- Widyawati, P.S., C.H. Wijaya, P.S. Hardjosworo, dan D. Sajuthi. 2010. Pengaruh Ekstraksi dan Fraksinasi terhadap Kemampuan Menangkap Radikal Bebas DPPH (1,1-difenil-2-pikrilhidrazil) Ekstrak dan Fraksi Daun Beluntas (*Pluchea indica* Less). *Seminar Rekayasa Kimia dan Proses ISSN: 1411-4216*. Semarang: Universitas Diponegoro. C(18):1-7.
- Widyawati, P.S., C.H. Wijaya, P.S. Hardjosworo, dan D. Sajuthi. 2011. Evaluasi Aktivitas Antioksidatif Ekstrak Daun Beluntas (*Pluchea indica*) Berdasarkan Perbedaan Ruas Daun. *Rekapangan Jurnal Teknologi Pangan* 5(1):1-14.
- Yu Lin, H., Y. H. Kuo, Y. L. Lin, and W. Chiang. 2009. *Antioxidative Effect and Active Components From Leaves of Lotus (Nelumbo nucifera)*. *Journal of Agricultural and Food Chemistry*, 57: 6623-6629.
- Yuniarti, N., A. Rohman, S. Riyanto, W.R. Saputra, R. Utami, and W. Mulatsih. 2010. *Antioxidant Activity, Total Phenolic, and Total Flavonoids of Extracts and Fractions of Red Fruit (Pandanus conoideus Lam)*. *International Food Research Journal* 17: 97-106.
- Zowail, M.E.M, E.H.H. Khater, and M.E.M. El-Asrag. 2009. Protective Effect of Green Tea Extract Against Cytotoxicity Included by Enrofloxacin in Rat Egypt. *Acad, J. biolog. Sci.* Vol. 1(1): 45-64.